A novel and simple approach for measuring ice nucleating particles in the atmosphere

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It is well known that only specific types of aerosol particles called “ice nucleating particles (INPs)” can act as nuclei for ice nucleation at temperatures warmer than about -36°C. Therefore, it is expected that the existence of INPs plays a key role in forming ice at relatively warm temperatures (e.g., in Arctic/Antarctic mixed-phase clouds). However, because of technical difficulties of the measurements, little is known about the amounts and sources of INPs in the real atmosphere. Recently, we succeeded to develop a novel original experimental system named the National Institute of Polar Research Cryogenic Refrigerator Applied to Freezing Test (NIPR-CRAFT) (Tobo, 2016). Since the NIPR-CRAFT system uses aerosol samples collected on a filter for meauring INPs, it is possible to collect the necessary samples at various locations using conventional aerosol samplers. So far, we have conducted intercomparison studies with various techniques and confirmed that the NIPR-CRAFT system can meaure INPs over much wider temperature and concentration ranges as compered with other existing techniques including various types of cloud chambers (Tobo, 2016; DeMott et al., 2017). Using this original technique, we have already conducted field measurements of atmospheric INPs at various locations, such as Mt. Zeppelin (Ny-Ålesund, Svalbard), R/V *Mirai*, the Tokyo Skytree (Tokyo, Japan), etc. In this presentation, we will introduce the examples of INP measurements performed using the NIPR-CRAFT system.

References

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